PROJECT facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Natural Gas Processing

8/2003

INNOVATIVE PROCESS FOR ENHANCED REAL-TIME DOWNHOLE-BLENDED FRACTURE STIMULATION OF DEEP NATURAL GAS RESERVOIR

True Real-time Downhole-blended Reservoir Stimulation

A better, safer method of recovering natural gas from low-production wells, which could potentially save the gas industry millions of dollars a year, was successfully performed for the first time at a 12,300-foot natural gas well in Carlsbad, New Mexico.

RealTimeZone Inc. (RTZ), through a DOE co-funded project, performed a hydraulic fracture stimulation that has enabled a well, which was scheduled to be plugged and abandoned, to produce 300,000 cubic feet a day of natural gas. The gas industry spends $1 billion-plus a year on fracture stimulations alone. The stimulation performed by RTZ showed a significant cost savings over a conventional stimulation method performed in the same formation. If this technology were used on 20% of the stimulations performed, it could save the industry nearly $100 million dollars per year.

PARTNERS

RealtimeZone
Roswell, New Mexico
NETL
Morgantown, West Virginia
Pittsburgh, Pennsylvania

LOCATION

Where:
Field test in well near Carlsbad, New Mexico
Principal point of performance:
Roswell, New Mexico
Other points of performance:
Artesia, New Mexico

COST

RealtimeZone	$549,952
DOE NETL	$1,209,060

DURATION

Project periods, Phase 1 through Phase 3, from 6/02/1999 through 12/02/2003

Field test conducted September 22, 2000

Background

The amount of oil and gas produced from a well falls as the well gets older. When the well is first drilled, gas or oil is forced from the ground by the pressure within the well. As that pressure falls, oil or gas needs to be pumped out of wells. Ultimately, the well stops producing. At this point, tertiary recovery methods can be used to stimulate production.

One such tertiary recovery method is the injection of liquid carbon dioxide into the well, along with other chemicals in order to fracture the rock strata and expose the well to a larger gas volume in the reservoir. The fractures extend from 300 to 100 feet into the rock strata. This type of stimulation is expensive, and, when the stimulants are mixed on the surface, there can be as much as 30 to 60 minutes delay in determining if the fracturing is successful. If the stimulation begins to fracture out of the gas zone, that long of a delay can result in failure of the stimulation.

Innovative Process for Enhanced Real-time Downhole-Blended Fracture Stimulation of Deep Natural Gas Reservoir

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CONTACTS

George Scott III
RealtimeZone
100 North Pennsylvania
Roswell, NM
505-622-6713
gscott@realtimezone.net

Gary Covatch
National Energy Technology Laboratory
3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880
304-285-4589
gary.covatch@netl.doe.gov

CUSTOMER SERVICE

800-553-7681

WEBSITE

www.netl.doe.gov

Successful Field Test

RealTimeZone, Inc. field tested a new procedure using downhole mixing to fracture the surround rock in a natural gas well. RTZ's method differs from previous practice in that it allows the fracture fluid to be mixed downhole, rather than on the surface. As a result, the delay between changing the stimulant mixture and the effect on the rock strata is less than 1 minute.

The RTZ procedure involved pumping liquid CO_2, methanol-gelled water, and proppant (material to prop open the fractures) down into the well and mixing these downhole. The resulting fractures in the rock strata increased the natural gas production of the well. The downhole-mixed composite fluid was injected at surface treating pressures averaging 5,000 psig into the natural gas reservoir (Morrow Formation in the Permian Basin) at 12,300 feet.

Downhole mixing of the stimulants in real-time is safer and more cost-effective stimulation for enhanced recovery of U.S. petroleum and natural gas reserves. The RTZ field test successfully demonstrated real-time control of a fracturing treatment with downhole mixing at a cost less than mixing the stimulants on the surface. Also, the cost of pumping and pressurization is significantly lower due to the lower injection pump pressures required for hydraulic reservoir fracturing at this depth (12,300 feet). A post-stimulation tracer survey confirmed that the reservoir fracturing and placement of proppant was successful. A resultant production rate of 300,000 cubic feet of gas per day was achieved. Prior to this test work, a major operator, OXY had scheduled this well (12,300 feet deep) for plugging and abandonment.